

The NSF Perspective on HEC-FSIO (as seen from CNS)

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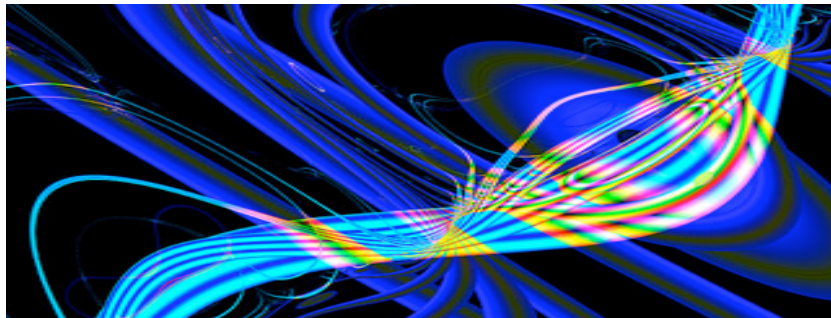
National Science Foundation

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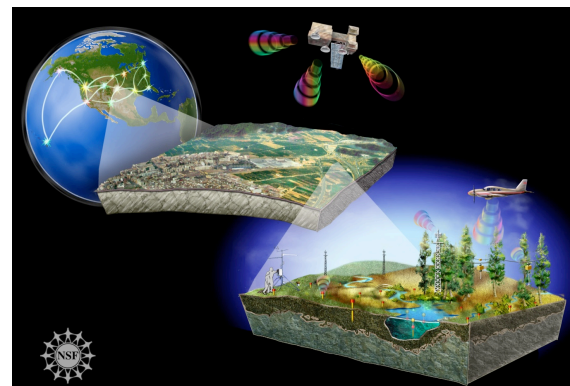
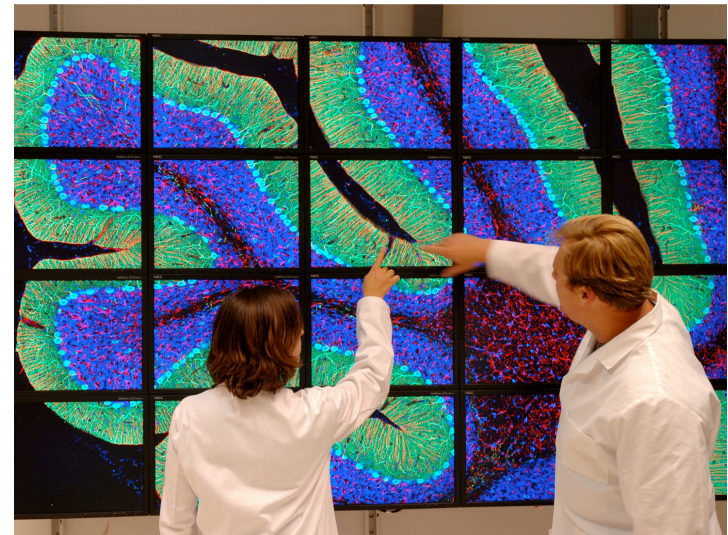
The Future of Computing

- Computer and Information Science and Engineering (CISE) is at the center of an ongoing **societal transformation** and will be for decades to come.
- The **explosive growth of scientific and social data**, wireless connectivity at broadband speeds for billions of endpoints – which are both people and environmental sensors – and seamless access to computational resources and applications in the “cloud” are transforming the way we work, learn, play and communicate.
- The impact of computing will go **deeper into the sciences and engineering** and will become more **pervasive** throughout society. Policy and privacy issues will loom larger as our reliance on technology and computationally-enabled collective intelligence grows.



Explosive Growth in Size, Complexity and Data Rates

- **Enormous static or streaming data sets** generated by modern experimental and observational methods
- **Infusion of computation into science and engineering** is revolutionizing research
- Shift toward indirect, **automatic extraction of new knowledge** about the physical or biological world continues to accelerate
- **Enabled by data mining and machine learning**, discovery and visualization techniques together with the emergence of multi-core processing and advanced server architectures



The Age of Observation: Smart Sensing, Reasoning and Decision

Environment Sensing



Percepts
(sensors)



Actions
(controllers)



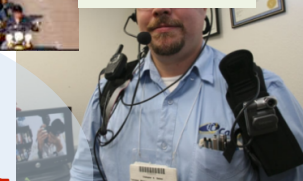
Agent
(Reasoning)

Pervasive

Emergency Response



Situation
Awareness
: Humans
as sensors
feed multi-
modal
data
streams



Computing

People-Centric Sensing



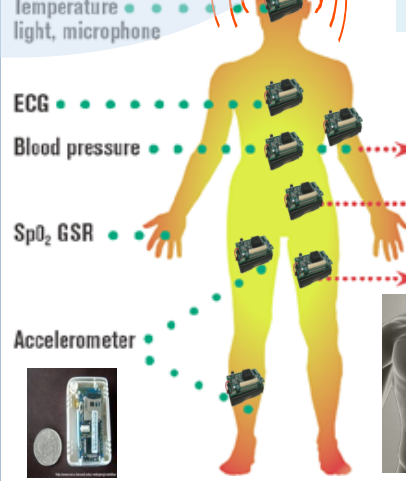
Public
Sensing

Personal
Sensing

Social
Sensing

Social

Informatics



Temperature
light, microphone

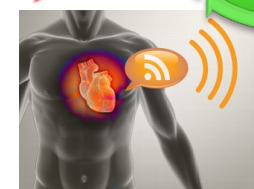
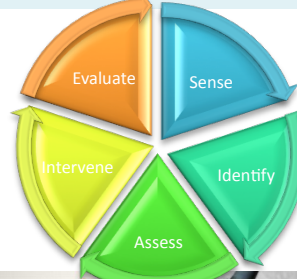
ECG

Blood pressure

SpO₂ GSR

Accelerometer

Smart Health Care



Source: Sajal Das, Keith Marzullo

Who is funding HEC FSIO?

- Office of Cyberinfrastructure is funding much of the innovative instrumentation work
 - OCI 0951583 Allen Snavelly, UC San Diego
 - EAGER: Prototype I/O Convolver
 - OCI 1064230 Helen Shen et al, Clemson
 - OCI 1064247 Anthony Skjellum, U. Alabama
 - EAGER: Collaborative Research: A Peer-to-Peer based Storage System for High-End Computing
 - OCI 1054974 Ioan Raicu, Illinois Inst. Tech.
 - CAREER: Avoiding Achilles' Heel in Exascale
 - Computing with Distributed File Systems
- See *Software Development for Cyberinfrastructure*,



Who is funding HEC FSIO?

- CISE is in this space, too!
 - CNS 1016609 Hong Jiang, UN Lincoln
 - Small: Turbo Button: A Semantically-Smart SSD-based RAID Systems for Internet-Scale Applications
 - CNS 0546551 David Andersen, CMU
 - CAREER: An Evolvable Architecture for Internet Data Transfer
- Take a look at the CNS core programs CSR and NeTS (NSF 11-555) – newly revised



CISE

- Don't be afraid to suggest work that crosses our programs:
 - Work in high performance computing crosses CCF and CNS
 - “Big data” involves all of the divisions in CISE
- If you have any doubts,
 - Contact a program director or two!
 - Come visit us!
 - Dream big!





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